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Version With Markings to Show Changes Made

DATA DISTRIBUTION METHOD AND APPARATUS AND  
DATA RECEIVING METHOD AND APPARATUS

BACKGROUND OF INVENTION

Technical Field

[0001] The present invention relates to digital data distribution, ~~technologies~~ such as a digital satellite broadcast or other multimedia contents communication, and in particular to ~~the technology of~~ distributing digital data ~~composed~~ comprised of computer language commands defining ~~having~~ data attributes. ~~— The digital data composed of~~ computer language commands ~~— having data attributes are~~ entered represented, for example, in the form of language ~~composed of tag data that are~~ is divided by tags that ~~defining~~ the data attribute, known as a ~~or~~ "markup language".

[0002] ~~To describe in more details, Further,~~ the present invention relates to the ~~technology of~~ distributing of data contents ~~of in a language format that using~~ uses arbitrarily definable tags ~~(for example, such as XML (eXtensible Markup Language))~~, within the form of data broadcast ~~or other similar forms and to the of~~ receiving and displaying of the ~~same content~~, and in In particular, the ~~technology invention~~ relates to the ~~of~~ distributing and selecting of style sheets for prescribing the expression format of XML instances, or XSL (eXtensible Style sheet Language) documents.

Background Art

[0003] In the ~~technical~~ field of broadcasting, the use of digitalization ~~of~~ data is rapidly ~~progressing~~ growing. Digital signals are superior to analog signals because ~~in terms of~~ their stability and the higher compressibility of the data. ~~is higher. And Further,~~ digital signals, whether they sent over



~~a may be cable, a ground wave or a satellite wave, can~~  
~~secure~~provide more channels than analog signals ~~in for~~ certain  
bands. In addition, ~~while though~~ various information, such as  
~~in the form of~~ documents, voice data and picture data are  
~~completely separated~~ in a ~~the~~ conventional information  
transmission, the ~~digitalization~~ digitized broadcast data  
enables ~~to transmission~~ of these monomedia data types  
indiscriminately.

[0004] For example, ~~in the case of~~ using a digital broadcast,  
~~it is possible to~~ improved services is provided to users  
(i.e., viewers) by sending EPG (Electric Program Guide) and  
other system information as ~~one part~~ of the data broadcast  
contents together with the image information and voice  
information. ~~(The EPG may includes the capability~~ functions of  
video recording, ~~reservation in addition to the indication of~~  
providing a broadcast schedule, a name of broadcast programs  
and other information ~~provided~~).

[0005] Data delivered in a digital format ~~have has~~ a high  
~~affinity compatibility~~ with general-purpose computer systems  
and with other non-television information equipment ~~other than~~  
TV. For example, ~~it is possible to equip~~ a general-purpose  
computer system may be equipped with a tuner card for  
satellite broadcasts, to parse the EPG data received in the  
computer, process the same for display, and ~~to display~~ program  
tables and other menu screens ~~on in~~ a window. ~~On~~ Using such a  
menu screen, it is possible to switch programs and reserve  
video recordings by ~~intuitively operating the~~ moving a mouse  
controlled cursor or ~~the~~ using a touch panel. ~~Of~~  
~~course~~ Moreover, it is possible to store the received data  
broadcast contents ~~received as they are on~~ a hard disc, that  
is integrated in with the computer, and to be reproduced or  
reused the data.

[0006] ~~And in~~ Moreover, using a digital broadcast, it is  
possible to enhance the interaction of broadcast programs by

taking advantage of the band used and by transmitting data other than the image and voice broadcast programs. For example, in a broadcast program in which ~~—true—false~~ quizzes are given, the transmission of answers as well as image and voice data ~~will enables~~ the satellite TV broadcaster receivers (i.e., viewers) to ~~provide—use~~ answer menu buttons on the computer display and to check the answers ~~in response to the responding operation of the users~~ by means of the mouse cursor or the touch panel.

[0007] When the interaction is further enhanced, home TV receivers ~~are expected to~~ may play an active role as an information controller ~~to not just handle~~ more than image contents. For example, a TV receiver ~~can may~~ serve as an ~~internet~~ Internet terminal ~~and anor~~ as an electronic commerce terminal.

[0008] In Japan, the ARIB (Association of Radio Industries and Businesses) is playing a central role in promoting ~~the~~ standardization ~~of the program related to~~ digital satellite data broadcast. ~~According to this, in~~ Using the digital satellite broadcast, ~~in addition to the image and voice data constituting the main body of the broadcast program (AV data),~~ digital transfer data ~~data accessory supplementary~~ to the broadcast program ~~are is distributed.~~ , in addition to the image and voice data constituting the main body of the broadcast program (AV data). More specifically, data were is transmitted as broadcast waves in the form of a “transport stream (described below)” obtained by multiplexing the AV data compressed by ~~the~~ a specified compression method, such as the MPEG (Motion Picture Experts Group) 2 format, and with digital transfer data.

[0009] An example of broadcast program information transmitted as data broadcast contents is the aforementioned EPG (Electric Program Guide). ~~And it is possible to include~~ Information inherent to the main body of the broadcast program may be

included, such as the title and date ~~of the main body of the~~ broadcast program as well as the program casting. ~~And the~~ The types of and the construction of the data contained in the broadcast program information are systematized to some extent in accordance with the service contents provided by the main body of the program. For example, information related to ~~the~~ recipes and food materials may be delivered with ~~in a~~ cooking program, the number of votes cast may be obtained and renewed constantly and then delivered in a real-time ~~in a prompt~~ report of election returns, ~~program,~~ and the individual ~~records of~~ batting and pitching records of various players and the team rankings may be delivered with ~~in a~~ professional baseball game ~~relay broadcast~~.

[0010] Broadcast program information is typically displayed ~~by using a part of the same display screen of the receiving system on which that displays~~ the main body of the broadcast program. ~~is outputted/displayed on the side of the digital satellite data broadcast receiving system (hereinafter referred simply to as "the receiving system") side. This~~ The receiving system ~~is normally composed by~~ atypically includes a receiver for receiving, tuning and decoding the broadcast wave, such as a (set top box+ (STB) and a television (TV) set for displaying/outputting the broadcast. ~~and The receiving system is typically installed at in the home of general audiencea viewer.~~

[0011] ~~And now, the~~ The construction of contents distributed as digital broadcast data, ~~(hereinafter referred to as "data broadcast contents"), will be~~ is explained by referring to Fig. 1.

[0012] As shown in Fig. 1, the data broadcast contents consists of a large variety of monomedia data including text data, still pictures, animations images, voices data, etc., ~~and as well as a display and output control program that prescribes the state of broadcast program information by~~

handling integrally each of these monomedia data or as multimedia data, (generally referred to as a "multimedia coding application"). It is possible to integrate link information corresponding to each the monomedia information to the display output control program.

[0013] In As part of the standardization of the digital satellite data broadcast work undertaken by the aforementioned ARIB, as a first attempt at a format for describing the multimedia coding applications for these of data broadcast contents, at first the used of MHEG (Multimedia and Hypermedia Expert Group), was examined. MHEG is a type of descriptive languages that defines data attributes, and displays multimedia contents on TVs and which is designed to allow viewers to obtain their desired information from Video On Demand (VOD) or digital TV broadcast. There are cases where MHEG-5 is already put to practical use as in the Japanese CS (Communication Satellite) digital broadcast (known as SKY Perfect TV).

[0014] MHEG, however, has uses a fixed coding space and lacks in extensibility. In other words, as a unilaterally fixed coding space must be used to describe a change of a single function. (For example, an API (Application Programming Interface)) requires a considerable amount of correction work. In addition, MHEG is generally little not well known, and thus data contents written in MHEG are is not circulating circulated in a sufficient quantity. In this sense, it MHEG has a relatively low affinity with applicability for the general-purpose computers.

[0015] As a result, the ARIB (aforementioned) is examining the standardization work based on XML (eXtensible Markup Language) in place of MHEG. More specifically, the work is progressing by in dividing the same content into "the basic XML", (also referred to as BML ("Broadcast Markup Language")), and "the advanced XML", an extended version of the basic XML.

[0016] ~~As XML allows for the optional definition of tags, or in other words and~~ has no restrictions on the way attributes are described, ~~it XML therefore~~ allows a high degree of freedom, and its high affinity with applicability in general-purpose computers and the Internet ~~can be mentioned as its provides~~ advantages over MHEG. Furthermore, XML is now being ~~elaborated developed~~ as a descriptive language for the next generation of the Internet.

[0017] When XML is used as the standard language of data broadcast contents, it is possible to exchange data for digital broadcast data among a variety of information equipment, such as computers, TVs, telephones, etc. In addition, as XML can be used to freely define tag attributes, it is ~~stronger in more~~ suitable for data processing than HTML (Hyper Text Markup Language). Consequently, its use is rapidly expanding in various fields including electronic commerce.

[0018] Document files written in XML format are called "XML instances." The ~~method of writing of~~ attribute information (or tag grammar) is governed by a standard ~~rule called~~ known as DTD (Document Type Definition). For example, ~~it is possible to establish a~~ DTD may be established for every industry (or for every service provided by each industry).

[0019] ~~And~~ XML instances themselves do not ~~sometimes~~ always contain the style information on the ~~expression~~ form (for example, ~~expressed, such as the form of display/the output to displays, or the form of print/the output to printers, etc.~~). In this case, the expression ~~method of the~~ XML instances is described by ~~the a~~ "style sheet" or a document file different from DTD.

[0020] The style sheet for XML instances can be written by using ~~in particular languages, such as in the form of the~~ "XSL (eXtensible Style sheet Language), ~~languages of the~~ "CSS (Cascade Style Sheet), ~~or languages of the~~ XSLT (XSL

Transformation) or a standard derived from the abovementioned.  
~~Or it is also possible to insert~~ Alternatively, a script in  
may be inserted into a style sheet. ~~(the term~~ A "script"  
~~means~~ is a method of executing software described in a text  
form in the same ~~way~~ manner as ordinary source programs. A  
script is used to ~~automate~~ ize a series of ~~processes~~ ing  
resulting from the combination of operating procedures that  
users can control ~~(for example, such as specific keys or~~  
~~buttons)~~, ~~on~~ in an application or in an OS (Operating  
System) ~~).~~.

[0021] Even ~~if the~~ when XML instances ~~may be~~ are the same,  
depending on the description in the style sheet concerned, ~~it~~  
~~is possible to express the same XML instance~~ may be expressed  
on the display screen ~~by~~ in a completely different form ~~of~~  
~~expression~~ by varying the font style, size or color. In other  
words, a style sheet has the function of ~~giving~~ providing  
added ~~value~~ information to the original XML instance. ~~And~~  
~~it~~ It can be assumed that the ~~value~~ importance of style sheets  
~~may rise~~ will grow in the future ~~and that~~ as more attractive  
style sheets ~~are of good presentation would be~~ designed by  
specialized designers. ~~specialized in style sheets.~~

[0022] Style sheets can be transmitted in a ~~files~~ separate  
from that ~~storing the~~ XML instances. For example, XML  
instances ~~themselves~~ may be distributed by data broadcast,  
~~while~~ whereas the style sheets may be ~~widely~~ distributed using  
~~by~~ other forms of distribution, for example, using portable  
recording media such as a CD (Compact Disc), an MO (Magneto-  
Optical) disc ~~),~~ a DVD (Digital Versatile Disc) or by file  
transfers through the ~~I~~Internet.

[0023] ~~In the meanwhile~~ Meanwhile, ~~lately~~ the choice of  
display apparatuses ~~serving as the~~ that can output ~~target of~~  
the data broadcast contents ~~have~~ are becoming more  
~~diversified~~ diverse. For example, in addition to the  
conventional NTSC (National Television System Committee)

~~system~~ color television systems, HDTV (High Definition Television) systems with many scanning lines for large screens, PDA (Personal Digital Assistant) devices with a monochrome liquid crystal display of a small screen size, and relatively high definition computer screens such as SVGA (Super Video Graphic Array) or XGA (eXtended Graphic Array) may be mentioned are under development.

[0024] Thus, Even if though the data contents ~~are~~ may be the same, when the display capacity of the output ~~targets~~ device is different, ~~obviously~~ the optimum form of the display is different. For example, a display format ~~of display~~ that is optimum for a high resolution, ~~and~~ high definition HDTV is not necessarily appropriate for a low resolution, ~~and~~ small screen PDA. As mentioned earlier, the format ~~of~~ used for expressing contents is ~~prescribed~~ defined by style sheets. ~~In other words, therefore~~ Therefore, the question ~~of which~~ style sheet that is appropriate for such contents is determined by the display and output capacity and expression capacity of the display apparatus to which the data contents ~~are~~ is outputted.

[0025] ~~And Also, even if~~ when the resolution and other hardware capacity ~~of~~ for the display apparatus ~~may be~~ are identical, the optimum format of display may be ~~different~~ differ depending on the manufacturer and the type of apparatus used.

[0026] In addition, depending on the attribute of data broadcast contents, ~~themselves~~ (for example, depending on the data shown by the tags ~~of~~ <POSITION>, <COLOR>, <SIZE>, etc.), the optimum choice of style sheet may be ~~different~~ differ.

[0027] ~~And Further,~~ the optimum style sheets or the style sheets most preferred by the receiving user are not always distributed together with the data broadcast contents.

#### ~~Disclosure of the Invention~~ SUMMARY OF THE INVENTION

[0028] It is therefore an object of the present invention to provide ~~an outstanding~~ a data distribution technology



~~capable of providing~~that provides documents in a language format in which arbitrarily definable tags are used, ~~(for example, XML (eXtensible Markup Language), style) in a format matching~~that are matched with each the output attributes and/or the contents attributes.

[0029] Another object of the present invention is to provide ~~an outstanding~~a data distribution technology ~~capable of providing~~that provides a ~~single content in a form matching~~matched with each output attribute or contents attribute when data ~~are~~is distributed ~~through~~via a broadcast or a network.

[0030] The present invention ~~was made by~~takes into account the above objects, ~~and its~~According to an first aspect is of the invention, a data distributing method or apparatus for distributing contents ~~consisting of data written in a computer language including the step or means of containing~~includes combining a plurality of information ~~provided matching with the output attributes in a single data content for distribution and the step or means of distributing~~esing the data content for distribution.

[0031] ~~In the data distribution method or apparatus related to the first aspect of the present invention, the~~The data written in a computer language ~~are~~may be, for example, data in ~~the a~~a language format using tags, or data in a language format using arbitrarily definable tags. ~~An example of such~~Such data ~~is~~may be an XML instance written in the XML (eXtensible Markup Language) format.

[0032] ~~And each of~~The information provided according to the output ~~attributed~~attributes may be data divided by tags.

[0033] If the data contents ~~for distribution are~~is formed of instances written in mark-up languages such as XML, it is possible to ~~prescribed~~their expression format, ~~(for example including the format of display in~~by a display

apparatus, or the format outputted and printed by a printer, by using a document called known as a "style sheet."

[0034] A The style sheet may prescribe an expression format according to the output attributes. The output attributes referred here consist of may include the resolution, manufacturer's name, model, etc. of the display apparatus used to display the contents data. In other words, it is possible to prepare in advance a large number of style sheets prescribing the optimum expression format for each output attribute, such as the resolution, manufacturer's name, model, etc. of the relevant display apparatus.

[0035] And The style sheets may include scripts, (The term "script" means i.e., a method executed by the software that is described in a text form like ordinary source programs, Scripts are used in order to automate a series of processing or combining operating procedures (for example, such as specific keys and buttons) that the end users can control on in an application or an OS.) In addition to the preparation of a plurality of optimum style sheets for each output attribute, it is possible to describe by a The script may be described by an the expression operation adapted to a plurality of output attributes.

[0036] And the second aspect of the present According to another aspect of the invention, is a data receiving method or apparatus for receiving contents formed consisting of data written in a computer language including the step or means of selecting a style sheet matching matched with contents identification information, and the step or means of processing received data contents using the selected style sheet.

[0037] In the data distributing method or apparatus related to the second aspect of the present invention, The data may be written in the a computer language are as data in the a language format using tags, or data in the a language format

using arbitrary definable tags. ~~An example of such as~~  
~~and data is~~ XML instance written in the XML (eXtensible Markup  
Language) format.

[0038] ~~If~~ When the distributed data contents ~~are~~ is formed  
of instances written in a mark up languages such as XML, it is  
possible to prescribe their expression form ~~(for example,~~  
~~format of display in a display apparatus, or format outputted~~  
~~and printed by a printer)~~ by a document called a "style sheet."

[0039] ~~A~~ The style sheet may prescribe an expression  
format matching ~~with~~ the output attribute. The contents  
identification information ~~referred heremay~~ represents the  
contents attributes and ~~are~~ is decided, for example, based on  
~~the~~ specified tag data in the XML instances, ~~taken as~~  
~~contents. Examples of such a tag data are~~ <POSITION>, <COLOR>,  
<SIZE>, etc. ~~In other words, it is possible~~ Thus, a large  
number of style sheets may be ~~to~~ prepared in advance ~~a large~~  
~~number of style sheets for~~ prescribing the optimum expression  
format for each output attribute.

[0040] ~~And~~ The style sheets may include scripts. ~~(The~~  
~~term "script" means a method executed by the software~~  
~~described in a text form like ordinary source programs.~~  
~~Scripts are used in order to automatize a series of processing~~  
~~combining operating procedures (for example, specific keys and~~  
~~buttons) that the end users can control on an application or~~  
~~an OS.)~~ ~~In addition to the preparation of a plurality of~~  
~~optimum style sheets for each output attribute, it is possible~~  
~~to describe by a~~ The scripts may describe the expression  
format matching with a plurality of output attributes.

[0041] ~~And the third~~ According to yet another aspect of the  
~~present invention,~~ is a data receiving method or apparatus  
for receiving contents ~~consisting~~ formed of data that is  
written in a computer language and ~~outputting~~ outputted the  
~~same in~~ by an output apparatus ~~including the step or means of~~  
~~storing~~ the output attribute information related to ~~said the~~

output apparatus, ~~the step or means of selecting~~ a style sheet matching ~~with the~~ stored output attribute information, and ~~the step or means of processesing~~ the received data contents using ~~the a~~ selected style sheet.

[0042] ~~In the data distributing method or apparatus related to the third aspect of the present invention,~~The data written in a computer language are ~~may be~~data in ~~the a~~ language format in which tags are used, or data in ~~the a~~ language format using arbitrarily definable tags.—, ~~An example of such as an data is~~XML instance written in the XML (eXtensible Markup Language) format.

[0043] ~~If~~When the received data contents are instances written in a mark up languages such as XML, ~~it is possible to prescribe their the~~ expression format may be defined ~~(for example, format of displays in a display apparatus, or format outputted and printed by a printer)~~ by a document called "style sheet."

[0044] ~~A~~The style sheet may prescribe expression formats in accordance with the output attributes.—, ~~The output attributes referred here consist of~~such as the resolution, manufacturer's name, model, etc. of the display apparatus, ~~used to display the contents data. In other words, it is possible to prepare in advance. a~~A large number of style sheets may be prepared previously for prescribing the optimum expression format for each output attribute. ~~such as the resolution, manufacturer's name, model, etc. of the display apparatus.~~

[0045] ~~And~~The style sheets may include scripts. In addition ~~to the preparation of a plurality of optimum style sheets for each output attribute, it is possible to prescribe by a script the~~ The expression format ~~matching that matches with a plurality of output attributes~~ may be defined by a script.

~~[0046] And the data receiving method or apparatus related to the~~The third present aspect of the ~~present~~ invention may include a ~~step or means of retrieving a style sheet matching on the network, when a stored style sheet matching with the output attribute information stored in said step or means of selecting style sheet cannot be selected. Or, a step or means of obtaining~~ Alternatively, a matching style sheet ~~through may be obtained using a portable recording medium when a stored may be provided when a style sheet matching with the output attribute information stored in said step or means of selecting style sheet cannot be selected.~~

~~[0047] And, the fourth~~According to still another aspect of the present invention, ~~is a data receiving method or apparatus for receiving contents consisting formed of data written in a computer language including the step or means of selectsing a style sheet matching that matches with contents identification information, and the step or means of processesing received data contents using the selected style sheet.~~

~~[0048] In the data distributing method or apparatus related to the fourth aspect of the present invention, The data written in a computer language are may be~~data in the a language format using that uses tags, or data in the a language format using that uses arbitrarily definable tags., ~~An example of such data is as an XML instance written in the XML (eXtensible Markup Language) format.~~

~~[0049] A style sheet may prescribe~~define expression forms adapted to the output attribute. The output attribute information ~~referred here~~may indicates the contents attributes, and ~~are may be determined based on the basis of specified tag data in the XML instances that form forming part of the contents.~~, ~~Examples of these tag data are such as <POSITION>, <COLOR>, <SIZE>, etc. In other words, it is possible to prepare in advance a~~ A large number of style

sheets ~~prescribing that~~ prescribe optimum expression forms for every content attribute may be defined in advance.

[0050] ~~And The~~ style sheets may include scripts. ~~In addition to the preparation of a plurality of optimum style sheets for each output attribute, it is possible to describe by a~~ Each script may define the expression operation for matching with a plurality of output attributes.

[0051] ~~And the~~ The present data receiving method or apparatus ~~related to the fourth aspect of the present invention may include a step or means of retrieving a matching style sheet matching on the network, when a style sheet matching with the output attribute information stored in said step or means of selecting style sheet cannot be selected in the above manner. Or, Alternatively, a step or means of obtaining a matching style sheet may be obtained through a portable recording medium. may be provided when a style sheet matching with the output attribute information stored in said step or means of selecting style sheet cannot be selected.~~

[0052] ~~And the fifth~~ According to a further aspect of the ~~present invention, is a data receiving method or apparatus for receiving contents consisting formed of data written in a computer language including the step or means of selectsing a style sheet matching that matches with contents identification information, the step or means of retrieving style sheets matching with the stored output attribute information from among a the style sheet server providing style sheets on the over a network, and the step or means of processesing the received data contents using the retrieved style sheet obtained by retrieval.~~

[0053] ~~And the sixth~~ According to a still further aspect of the ~~present invention, is a style sheet providing method or a server providing style sheets through one or more networks including the step or means of storesing one or more style sheets prescribing the an expression format for each output~~

attribute of various output apparatus, ~~the step or means of~~ receivesing ~~the requests for the provision of~~ style sheets in a format ~~including that includes~~ information on output attributes, and ~~the step or means of extractsing~~ a style sheet matching with the output attribute specified by in the request for provision.

[0054] ~~And the seventh~~ According to yet a further aspect of the ~~present invention,~~ is a data receiving method or apparatus for receiving contents ~~composed~~ formed of data written in a computer language and ~~outputting~~ outputted ~~the same to~~ an output apparatus ~~including the step or means for storesing~~ contents attributes related to the contents received, ~~the step or means of retrievesing~~ style sheets matching with the contents attributes information ~~stored in the~~ from a style sheet server ~~providing style sheets on the~~ over a retrieved network, and ~~the step or means of processesing~~ the data contents received using the retrieved style sheet ~~obtained by~~ retrieval.

[0055] ~~The eighth~~ According to an additional aspect of the ~~present invention,~~ is a style sheet providing method or a server for providing style sheets ~~through~~ via a network ~~including the step or means of storesing~~ one or more style sheets ~~that prescribing the~~ prescribe an expression format for each contents attribute, ~~the step or means of receivesing~~ requests for the provision of style sheets in having a format ~~that including includes~~ information on contents attributes, and ~~the step or means of extractsing~~ a style sheet matching ~~with the~~ output attribute specified by the ~~supply~~ request.

[0056] ~~And the ninth~~ According to yet an additional aspect of the ~~present invention,~~ is a data contents processing system ~~for distributing, receiving and processing~~ distributes, receives and processes contents ~~composed~~ formed of data written in a computer language and ~~outputsting~~ the same to an output apparatus. ~~including a means of distributing a~~ A

plurality of information provided according to the contents attributes and/or output attributes contained in a single data contents ~~for is distribution~~distributed. ~~a means of storing~~ ~~Output~~ attributes information concerning ~~said the~~ output apparatus and/or the contents attributes concerning the received data contents is stored. ~~received, a means of selecting style~~ Style sheets matching ~~with the~~ output attributes information and/or the content attributes stored are selected, and ~~a means of processing the data contents~~ content received using the selected style sheet ~~selected are~~ processed.

[0057] ~~And the tenth~~ According to a still additional aspect of the ~~present invention, is a data contents processing system~~ for distributing, receiving and processing contents ~~composed of~~ formed of data written in a computer language and ~~outputting the same~~ outputted to an output apparatus. including ~~a means of distributing a~~ A plurality of information provided in accordance with the contents attributes and/or the output attributes contained in a single data content ~~for is~~ distributed ~~ion, a means of storing~~ ~~t~~ The output attributes information concerning ~~said the~~ output apparatus and/or the contents attributes concerning the data contents received, is stored. ~~of requesting s~~ Style sheets matching ~~with the~~ output attribute information and/or the stored contents attributes are requested. ~~stored, and of processing t~~ The data contents received using the style sheets provided are processed, ~~a means of storing~~ ~~e~~ One or more style sheets prescribing the expression format for each output attribute and/or for each contents attribute ~~that of each output apparatus are~~ is stored. ~~has, and of providing s~~ Style sheets having ~~of~~ formats containing information on the output attribute and/or on the contents attribute are provided in response to requests ~~for the same~~.



~~[0058] And the eleventh~~According to a further additional aspect of the ~~present invention,~~ is a program recording medium ~~for records,~~ing in a tangible and computer-readable format, a computer program for executing, on a computer system, a data distribution process for distributing contents ~~composed~~ formed of data written in a computer language, ~~—.~~ ~~said computer program including the step of including a~~ A plurality of information ~~provided matching with~~ output attributes and/or contents attributes are included in a single data content for distribution, and ~~the step of distributing the step of the data content for~~ is distributed ~~ion.~~

~~[0059] And the twelfth~~According to a still further additional aspect of the ~~present invention,~~ is a program recording medium ~~for records,~~ing in a tangible and computer-readable format, a computer program for executing, on a computer system, ~~the a~~ process of receiving contents ~~composed~~ formed of data written in a computer language and outputteding ~~the same on~~by an output apparatus, ~~said~~ The computer program ~~including the step of storing~~ output attributes information concerning on ~~said~~ output apparatus and/or the contents attributes ~~on of received contents received,~~ and ~~the step of selecting~~ style sheets matching stored with output attributes ~~information and/or matching stored contents attributes stored,~~ and ~~the step of processesing the received data contents received using the selected style sheets selected.~~

~~[0060] And the thirteenth~~According to an added aspect of the ~~present invention,~~ is a program recording medium provides,ing in a tangible and computer-readable format, a computer program for executing, on a computer system, the process of providing style sheets supplied through a network, ~~said~~ The computer program ~~including the step of storing~~ one or more style sheets prescribing ~~the an~~ expression format of the output attributes of each output apparatus and of each content attribute ~~of contents~~ for distribution, ~~the step of~~

~~receivesing~~ requests for the ~~provision of~~ style sheets in ~~having~~ a format ~~including which includes~~ information on the output attributes and/or ~~on the~~ contents attributes, and the ~~step of extractsing~~ and ~~transmitsting~~ style sheets matching with the output attributes and/or ~~the~~ contents attributes specified by the requests ~~for provision~~.

[0061] ~~According to the data distribution method or apparatus related to the present invention, a~~ plurality of ~~information~~ may be provided in accordance with the output attributes ~~on the receiver/decoder side and the attributes of the data contents that are to be provided.~~ ~~(for example, data broadcast contents), are~~ may be contained in a single data content ~~for distribution and are distributed as such.~~ As a result, the ~~handling of~~ distribution of contents ~~is faecilitated~~ at data distributors, ~~(for examplesuch as broadcast servers, )~~ is improved.

[0062] ~~Since each~~ Because the information ~~provided matching with the output attributes and contents attributes in the data contents distributed are data~~ is divided by tags, each ~~of the data~~ can be processed separately. The ~~format of providing information in accordance with output attributes and contents attributes, or expression format, is prescribed by style sheets. Therefore,~~ Moreover, by selectively using style sheets, the ~~format of providing information adapted to output attributes and contents attributed~~ can be prepared in advance.

[0063] And ~~according to the data receiving method or apparatus related to the present invention, u~~Upon receiving a single distribution data content that includesing a plurality of ~~information provided matching with the~~ output attributes or ~~the~~ contents attributes, ~~it the data~~ can be converted into a specified expression format by ~~using~~ selectingvely a style sheet matching ~~with the contents received, and the date then~~ can be displayed ~~on a display.~~

**[0064]** ~~And according to the data receiving method or apparatus related to the present invention, w~~When one or more style sheets are supplied ~~through~~ via a data broadcast, the Internet, a portable recording medium, ~~and or~~ other various forms, ~~the an~~ optimum style sheet ~~matching that matches~~with the output attributes ~~(for example resolution, manufacture's name, model name, etc.)~~ of an output apparatus ~~provided on the receiver/decoder (for example, display apparatus of a TV)~~ can be selectively stored. ~~In other words~~Thus, receiver/decoder users ~~can benefit from the possibility of contents being displayed in the optimuma~~ format optimized for the display apparatus.

**[0065]** ~~And The~~ users may ~~use~~employ the user interface on their receiver/decoder to personally select a style sheet ~~matching that matches~~ with the contents distributed.

**[0066]** ~~When the present invention is applied to~~ For a satellite or ground wave ~~broadcast broadcast, business, it is possible to provide~~ information matching with a plurality of output attributes and contents attributes may be provided based on a single data broadcast content.

**[0067]** ~~And when~~When the ~~present invention is applied to the distribution of information is distributed over~~through the Internet, ~~it is possible to realize the output of~~the contents is outputted in the optimum output-format ~~(for example display on the screen)~~determined by judging the output attributes or contents attributes supplied through the input screen on the home page.

**[0068]** The program recording media may be, ~~according to each of the eleventh to thirteenth aspects of the present invention are media providing computer programs in a tangible and computer-readable format to,~~ for example, a general-purpose system capable of executing various program codes and ~~The recording media may be a~~ detachable and portable

recording ~~media~~ medium such as a CD (Compact Disc), an FD (Floppy Disc) ~~and or an~~ MO (Magneto-Optical disc).

[0069] Such recording media define ~~the a~~ structurally or functionally synergetic relationship between certain ~~specified~~ computer programs and the recording media ~~in order to realize~~ the functions of computer programs on the computer system. ~~In other words, the installation of specified computer programs in the computer system through program recording media according to each of the eleventh to thirteenth aspects of the present invention leads to synergy on the computer system, and produces effects similar to the first to fourth aspects, or the sixth and eighth aspects.~~

#### ~~Brief Descriptions of Drawings~~ BRIEF DESCRIPTION OF THE DRAWINGS

[0070] Fig. 1 is a schematic ~~drawing~~ diagram showing the ~~construction~~ structure of the data broadcast contents.

[0071] Fig. 2 is a ~~drawing~~ diagram showing the ~~schematic~~ a configuration of a digital satellite data broadcast system ~~1000~~ designed for carrying out the present invention.

[0072] Fig. 3 is a schematic ~~drawing~~ diagram showing the structure of data broadcast contents ~~diffused as broadcast wave in the a~~ digital satellite data broadcast.

[0073] Fig. 4 is a schematic ~~drawing~~ diagram showing the ~~construction~~ structure of data stored in data modules ~~contained within the in~~ digital transfer data.

[0074] Fig. 5 is a schematic ~~drawing~~ diagram showing the ~~a~~ configuration for transmitting digital transfer data within in ~~Broadcast Server 1, a~~ transmitting system.

[0075] Fig. 6 is a schematic ~~drawing~~ diagram showing the ~~a~~ hardware configuration of an example of a receiving system ~~10~~ A of at a receiver/decoder of the invention 10 (or general household), and, more specifically, a drawing showing the a configuration of a receiving system ~~10~~ A executed in the form of an STB (Set Top Box).

[0076] Fig. 7 is a schematic ~~drawing diagram~~ showing the another hardware configuration of a receiving system of the invention 10-B related to another example, and, more specifically, a drawing showing the a hardware configuration of a receiving system 10-B executed in the form of equipping a general-purpose computer with having a tuner card used for satellite digital broadcast.

[0077] Fig. 8 is a schematic ~~drawing diagram~~ showing the a hierarchical configuration of various software programs executed in the digital broadcast data receiving systems 10 shown in Figs. 6-7.

[0078] Fig. 9 is a ~~schematic drawing diagram~~ showing the way manner in which data broadcast contents are is transferred to the a receiver/decoder 10 from the a broadcast server 1 through via a broadcast satellite-5.

[0079] Fig. 10 is an ~~schematic illustration~~ of the a method of selecting style sheets in the receiving system-10.

[0080] Fig. 11 is a ~~drawing diagram~~ showing an example of a determination logic configuration-example of a determination logic-84.

[0081] Fig. 12 is an illustration of the ~~procedure of processing the of received data broadcast contents in the receiving system-10.~~

[0082] Fig. 13 is a schematic ~~drawing of the document construction of diagram~~ showing a XML instances structure handled in this embodiment.

[0083] Fig. 14 is ~~drawing a diagram~~ showing an example of processing described in Java script adapted to the output attribute and/or contents attribute processing described written in Java script.

[0084] Figs. 15A, 15B and 15C are ~~drawings diagrams~~ showing examples of how various display formats related to the same information service that are switched by according to a Java script.

~~Best mode for Carrying out the Invention~~ DETAILED DESCRIPTION

[0085] ~~A specified~~ An example of a structure of the present invention is hereinafter explained with reference to the drawings.

[0086] Fig. 2 shows ~~the schematic~~ a configuration of a satellite digital broadcast system 1000 ~~designed for carrying out the present invention. As shown in the drawing, the~~ The satellite digital broadcast system 1000 comprises a Broadcast Server 1 for providing broadcast services, a Broadcast Satellite 5 for relaying broadcast data, and a Receiver/Decoder 10 for receiving the broadcast data from the Broadcast Satellite 5.

[0087] ~~There is one~~ One or more Broadcast ~~Server or Servers~~ 1 ~~on earth~~ are located on the ground, and, the Broadcast Satellites 5 ~~are scattered~~ dispersed far above the earth. And ~~the~~ The Receiver/Decoder 10 corresponds to a households in general and may be ~~is~~ present in an unlimited number ~~on earth.~~ The distribution of data Data is delivered through the Broadcast Server 1 and the Broadcast Satellites 5 as a ~~or~~ broadcast is one-way communication.

[0088] ~~In~~ For a digital data broadcast, data are ~~is~~ transferred at a ~~transfer~~ rate of 10 to 50 Mbps. The Broadcast Server 1 multiplexes AV (audio and visual) data constituting the main body of broadcast programs ~~and together with data broadcast contents that includes including program information accessory supplementary to the broadcast programs and distributes the same. The AV data are~~ is normally compressed ~~by according to the MPEG (Motion Picture Experts Group) 2 format to be transmitted.~~

[0089] Data broadcast contents storage modules consisting comprised of various monomedia data, including text data, still picture data, animation data and voice data, and as well as a program for controlling the display and output of

~~these~~ the monomedia data or of the "multimedia coding application" ~~is~~ are delivered in a form of a data carousel.

[0090] The multimedia coding application is described in the XML (eXtensible Markup Language) language format and includes a DTD document defining the document format. ~~(however~~ The DTD documents and/or style sheets, however, are not ~~sometimes~~ always included in the contents for distribution~~).~~ ~~And~~ ~~each~~ Each module includes a script ~~prescribing~~ defining the voices, still pictures and movements used in animations.

[0091] Each Receiver/Decoder 10 and Broadcast Server 1 may be linked bidirectionally by a wide area network 7, such as the Internet, or by a leased line (not shown). In this case, the Internet 7 may ~~be used~~ serve as the ~~upward~~ upstream line from the Receivers/Decoders 10 to the Broadcast Server 1. For example, it is possible to provide partially on-demand broadcast services using the Internet 7. In this case, however, it is preferable that ~~they be linked with a~~ high-speed analogue telephone ~~line~~ link of 56 Kbps or more, a high-speed wireless communication link of about 10~ to 64 Kbps, a 128 Kbps ISDN (Integrated Services Digital Network) link or a 5~ to 30 Mbps class cable link ~~is be~~ used.

[0092] ~~As is known already,~~ innumerable hosts, ~~(i.e.,~~ computer systems~~),~~ are scattered on the Internet 7 and are connected ~~by using,~~ for example, TCP/IP (Transmission Control Protocol/Internet Protocol). Some of the hosts are servers that provide information to other servers for a ~~fee~~ consideration or free of charge.

[0093] Typical examples of servers on the Internet 7 are Web servers, known as ~~(or~~ WWW (World Wide Web) servers~~),~~ that provide HTTP (Hyper Text Transfer Protocol) objects described in ~~the~~ HTML (Hyper Text Markup Language) ~~for a consideration or free of charge.~~ ~~And in this embodiment, it is assumed that~~ "a Style Sheet Server" ~~(provisional name)~~ distributes ing

style sheets for a ~~fee~~consideration or for free of charge ~~through~~via the Internet ~~7-exists~~.

[0094] In Japan, the ARIB (Association of Radio Industries and Businesses) ~~has~~took ~~the~~ initiative ~~to~~ pursued standardization ~~works related to~~of the digital satellite data broadcast. According to this standard, ~~in digital satellite data broadcast,~~real-time AV data constituting the main body of the digital satellite broadcast programs as well as~~and the~~ data broadcast contents which is supplementary ~~accessory~~to the broadcast programs are distributed in parallel.

[0095] Here, ~~the~~The ~~construction of~~structure of the contents distributed by the digital satellite data broadcast ~~will be~~is now explained with reference to Figs. 3 and ~~Fig~~ 4.

[0096] Fig. 3 shows schematically the ~~construction~~ structure of broadcast ~~contents diffused~~content delivered as ~~broadcast waves in~~as part of the digital satellite data broadcast. ~~As shown therein,~~ Broadcast contents are ~~is~~ constituted in the form of ~~as~~ "a transport stream" obtained by multiplexing real-time AV data which is compressed ~~by~~according to a specified compression ~~method~~standard, such as MPEG (Motion Picture Experts Group) 2, and then ~~data broadcast contents (the transport stream is broken down into the transport layers of the OSI (Open Systems Interconnection) reference model).~~ The ~~former~~ real-time AV data constitutes the main body of satellite broadcast programs, and the ~~latter~~ ~~data broadcast contents~~ constitutes broadcast program information ~~accessory~~supplementary to the main body of broadcast programs and other data broadcast services.

[0097] The ~~portion of~~ data broadcast contents consists of a plurality of data modules. Each data module includes various types of information ~~accessory~~supplementary to the main body of broadcast programs. An example of broadcast program information is the EPG (Electric Program Guide) ~~(The EPG which includes the functions of reserving VTR recording in addition~~



~~to and~~as well as the display of a broadcast schedule and ~~program~~ names of broadcast programs}. And ~~b~~Broadcast program information may include information ~~proper~~ relating to the main body of a broadcast program, such as the title and date of the broadcast program and ~~the~~ casting of ~~the~~ program.

[0098] As shown in Fig. 3, ~~the~~ portions of ~~thesuch~~ data broadcast contents are transformed into a data carousel, ~~and so that~~ each data module is ~~programmed~~ to ~~appears~~ repeatedly during the broadcast of the main body of the program. As a result, the receiving system 10 can obtain a desired data module at an arbitrary time ~~ing~~ during the broadcast ~~period~~ of the program, and ~~thea~~ cache memory ~~for cache~~ can be omitted. ~~And it is possible to bury~~ Also, "automatic starting flags" for ~~synchronizati~~ing with the display output time of modules in the MPEG-2 compressed real-time AV data may also be stored therein ~~compressed by MPEG 2 compression method~~.

[0099] Fig. 4 ~~schematically~~ shows the data ~~construction~~structure of a data module. ~~As shown in the drawing,~~ The data module consists of a plurality of resource elements including a control program stipulating which determines how the data broadcast should be displayed or outputted, (hereinafter referred to as a "multimedia coding application"), scripts stipulating movements, voice data, text data, still pictures, animation data and other monomedia data. Each monomedia data ~~are~~ objects constituting a part of the data broadcast, ~~and is~~ are handled ~~comprehensively~~ by multimedia coding applications.

[0100] Each resource element ~~constituting of~~ a data module is an independent file having a specified format. Voice data ~~is~~are written ~~by using~~ file formats exclusively made for voice, such as ~~for example~~ AIFF, WAV, and AAC. ~~And s~~Still picture data ~~are~~ is written by using file formats exclusively made for images, such as JPEG, PNG, and GIF. The ~~top~~ resource

location information describes the position ~~information~~ of each resource element in the data module.

[0101] A ~~"M~~multimedia coding application" is a program for controlling how the EPG, advertisement information and other various data ~~broadcast accessory supplementary~~ to the main body of broadcast programs ~~should~~ is to be displayed and outputted. ~~The ARIB is examining the standardization work on data broadcast based on~~ XML (eXtensible Markup Language) may be used as a format for describing multimedia coding applications.

[0102] XML is a descriptive language wherein tags are freely defined, ~~in other words~~ namely, attributes can be described without restrictions. ~~It XML allows therefore for a~~ high degree of freedom, and is highly ~~affinitive~~ compatible with general-purpose computers and with the Internet. ~~Allowance of The~~ optional definition of tags allows for means, ~~in other words, the intention of handling of~~ a string of characters written in a document as data to which meanings are assigned. In other words, the definition of the tags enables ~~to the expression of each tag data divided by a tag as data~~ having a meaning which is other than a simple purpose of displaying. In addition, the definitions of the tags ~~construction enables to the structuring~~ ze and ~~describe~~ describing of the XML instances and the data in of such instances.

[0103] Distribution contents described in the XML language format is ~~are~~ given meanings according to the tag definition. As a result, data intended ~~made~~ originally for a digital broadcast ~~are~~ can be exchanged among a variety of information devices, such as computers, TVs, telephones, etc.

[0104] The definitions of the tags, or the definitions of document formats ~~as~~ XML instances, are set out ~~described~~ in DTD (Document Type Definition) documents. In addition, because ~~as~~ XML instances themselves do not contain style

information specifying an actual format of an expression, style sheets may be attached thereto. The sStyle sheets may be written in XSL (eXtensible Style Sheet Language), CSS (Cascade Style Sheet) language, or XSLT (XSL Transformation), which is a standard derived from the XSL.

[0105] ~~Apart~~And separately from the style sheets, scripts stipulating the movements of multimedia contents consisting of various monomedia data, including voice, text, still pictures, animation, etc., can be used.

[0106] Fig. 5 shows aschematic configuration for transmitting data broadcast contents using~~in~~ the Broadcast Server 1 or using another transmitting system. The broadcast system 1 is comprised~~composed~~ of athe Producing~~tion~~ Section 100, ~~the~~ Outgoing Searching Section 200 and athe Transmitt~~ing~~ssion Section 300. ~~Explanations on each section follow.~~

[0107] The Producing~~tion~~ Section 100 produces ~~the~~corresponds to the site where each content of the broadcast program information that is to be sent out as a data broadcast contents ~~is~~ produced. In other words, the Producing~~tion~~ Section 100 produces various resource elements constituting a data module, such as XML (eXtensible Markup Language) instances, style sheets prescribing the expression format of the XML instances, still pictures, animation data, voice data, subtitles (texts), and other monomedia data, (hereinafter referred to as "AV/subtitles"), as objects contained in broadcast program information.

[0108] These broadcast contents ~~are~~is transferred to the Sending Section 200 through, for example, a LAN (Local Area Network) ~~of~~ laid in the Broadcast Server 1.

[0109] The Sending Section 200 packets the output data using a ~~by each of the~~ Contents Sending Transfer System 201, a Base Band Controlling System 202, and AV Encoder 203, and a Superimposing caption or Subtitle Insertion System ~~Insertion~~

204, and transfers the packeted data to the Transmission Section 300.

[0110] In the ~~Transmittingsession~~ Section 300, XML instances are codified at ~~a~~the Multimedia Coding Section 301 ~~and to be~~ transferred to ~~a~~the Contents Transmission System 302. ~~A~~The Synthesis Section 304 synthesizes the output data ~~from~~from each ~~of the~~ Contents Transmission System 302 and ~~the~~ AV Subtitles Transmission System 303. ~~A~~And the Modulation Section 305 modulates the synthesized signals ~~into~~to RF signals, and transmits the same to ~~the~~Receivers/Decoders 10 through a RF transmission line.

[0111] On the RF transmission line, ~~the~~ RF signals are ~~in~~ the first place transmitted from the transmission antenna ~~of~~ installed at the Broadcast Server 1 to the Broadcast Satellite 5, and then, after passing through the Broadcast Satellite 5, ~~the same~~ are received by the receiving antenna of the Receiver/Decoder 10.

[0112] Fig. 6 shows ~~the schematic hardware configuration of~~ an example of ~~a~~ digital satellite data broadcast receiving system 10-A ~~of~~ installed at a receiver/decoder 10. The receiving system 10-A is widely ~~used~~ diffused among the ~~general households,~~ for example, in the form of ~~a~~ called STB (Set Top Box).

[0113] In the receiving system 10-A, ~~a~~ CPU 11 ~~serves~~ as the main controller ~~and~~ is interconnected with various hardware components through a bus 50 to exercise ~~a general~~control over each of the components. ~~The following are explanations on~~ each of them.

[0114] Broadcast waves ~~are~~ received by an antenna (not shown) ~~and is~~ supplied to a tuner 51. The broadcast waves ~~follows~~ ~~the~~are arranged in a specified format, ~~but it~~ and may ~~be~~ ~~comprise~~ cable broadcast waves, ~~or~~ ground waves, ~~in~~ addition to the broadcast wave ~~for~~er satellite broadcast waves

or other transmitted waves ~~stated above, and it is not limited~~ particularly.

[0115] The tuner 51, ~~while following the under~~ instructions ~~given by from~~ the CPU (Central Processing Unit) 11, tunes in to one or more specified channels, and outputs the received data to a demodulator ~~the subsequent decoder~~ 52. The ~~demodulatordecoder~~ 52 decodes the received data ~~that are~~ modulated into digital signals. The configuration of the tuner 51 depends ~~In the meantime, depending~~ on whether the broadcast waves ~~transmitted are~~ analogue or digital signals, ~~the configuration of the tuner 51 may be changed or enlarged accordingly.~~

[0116] The demodulated digital data is in the form of ~~are~~ "a transport stream" ~~obtained by multiplexing~~ formed of AV data, previously compressed using ~~by~~ the MPEG 2 compression ~~method~~ standard, and data broadcast contents. The ~~former~~ AV data contains ~~are~~ visual and audio information that constitute ing the broadcast program body. ~~And the latter~~ digital transmission data are The data broadcast content is ~~accessory data~~ supplementary to this broadcast program body, and includes, for example, an EPG (Electric Program Guide). ~~Data broadcast contents will be described in details later. It should be noted in the meanwhile that the transport stream is one part of~~ classified in "the transport layer" ~~as described in the OSI (Open Systems Interconnection) reference model.~~

[0117] A transport stream ~~The~~ (TS) decoder 53 interprets ~~the~~ this transport stream, divides the transport stream ~~it~~ into the AV data ~~compressed by the MPEG 2 compression method and~~ the data broadcast contents, transfers the AV data ~~former~~ to an ~~the~~ AV decoder 54 and the data broadcast content ~~latter~~ to the CPU 11 through the bus 50. The TS decoder 53 may be provided with a memory 53A for storing work data ~~in its~~ locally.

[0118] Upon receiving real-time AV ~~data~~compressed by the MPEG-2 ~~method~~ from the TS decoder 53, the AV decoder 54 divides the AV data~~same~~ into compressed picture data and into compressed voice data. The picture data is~~are~~ then ~~processed~~ ~~for expansion~~ ~~de-compressed~~ according to ~~by~~ the MPEG2 ~~method~~standard to reproduce the original picture signals, and the voice data is~~are~~ ~~decoded by the~~ using PCM (Pulse Code Modulation) ~~method~~ and then synthesized with added sound to ~~produce~~ reproduced the voice signals. The AV decoder 59 may be provided with a memory 54A for storing work data ~~in its~~ locally. The reproduced picture signals are then displayed and ~~outputted~~ on a display 61 via ~~through~~ a multiplexer 55B, and the reproduced voice signals are outputted ~~to by~~ a speaker 62 via ~~through~~ ~~a the~~ multiplexer 55A.

[0119] A user interface (U/I) controller 56 ~~is a module for~~ processes the input ~~operation of~~ provided by users, and processes signals received from a ~~has the function of allowing~~ remote controls 66 by ~~means of~~ which operating buttons/switches (not shown) are used to send ~~for the direct~~ manual input from the ~~operation by users and via~~ infrared rays (IR). ~~And it may include a~~ display panel or a LED indicator (not shown) may be included to display the current settings.

[0120] One of the operating buttons of the user interface controller 56 or one of the operating buttons of the remote controller 66 may be ~~is~~ allocated to a ~~button for~~ operating the validation/~~invalidation~~ of the display output received from the display controller 57 to provide the ~~(described below)~~ ~~(~~ display/output of program information based on the data broadcast contents~~)~~.

[0121] The CPU ~~(Central Processing Unit)~~ 11 controls ~~is the~~ main ~~controller~~ ~~controlling~~ the whole operation of the receiving system 10-A and. ~~And the CPU 11 can~~ processes the data broadcast contents transferred through the bus 50. ~~In the present embodiment,~~ The data broadcast contents includes are

instances described in the XML (eXtensible Markup Language) format. ~~(described later)~~, and ~~T~~the CPU 11 can apply ~~execute~~ processing software, ~~(described later)~~ such as XML parsing and XSL processing software, on the XML instances ~~(both of them are hereinafter referred to and serves as an as "XML engines")~~ on a platform ~~controlled~~provided by an operating system (OS).

[0122] A RAM (Random Access Memory) 12 ~~is used to loads~~ the execution program code or writes work data for the execution program of the CPU 11. And ROM (Read Only Memory) 13 ~~is a read only memory for permanently storing~~ stores a self-diagnostic and/or an initialization program to be executed when the receiving system 10 is switched on. ~~or~~ The ROM may also store a microcode for operating the hardware.

[0123] A sSerial input/output (SIO) controller 14 is a peripheral ~~controller device~~ for exchanging serial data with external devices of the receiving system 10-A. ~~The~~ A serial port provided on the SIO controller 14 ~~accepts~~ provides an external connection ~~with~~ to a high-speed modem 63 ~~(with a transfer rate of, for example, 56 Kbps)~~ for modulating/demodulating transfer data on the analogue telephone line. A PPP (Point-to-Point Protocol) connection may be provided to a specified access point (not shown) by ~~this~~ the high-speed modem 63 ~~results in and connects~~ the receiving system 10-A ~~being connected to the Internet 7 as a~~ or other wide area network.

[0124] ~~The~~ An IEEE (Institute of Electrical and Electronics Engineers) 1394 interface 15 ~~is~~ provides a serial-high-speed, serial interface that ~~enables to transmit~~ transmits and receives data at a rate of about several hundred Mbps. The IEEE 1394 port can accept ~~the~~ daisy chain connections ~~or tree connections of~~ to external apparatuses according to the IEEE 1394 standard, ~~As apparatuses according to the IEEE 1394 standard, for examplesuch as a~~ —video camera 64 or scanner (not shown)—can be mentioned.

[0125] ~~The A~~ hard disc drive (HDD) 17 ~~is an~~ provides external storage ~~apparatus for storing~~ programs and data arranged in a prescribed file format, and ~~normally typically~~ has a relatively large capacity of several GB. The HDD 17 is connected ~~to with~~ the bus 50 through a hard disc card interface (I/F) 18.

[0126] The hard disc card interface 18 ~~is an apparatus for~~ executes the bus protocol between a card-type device 65, loaded ~~on in~~ a card slot 19, and the bus 50. ~~An example of the~~ Such a card-type device 65 ~~is includes~~ a PC card that is the size of a credit card ~~size and~~ constructed as a cartridge. The PC ~~card~~ PC card ~~is governed by~~ operates using the "PC Card Standard" jointly formulated by the PCMCIA (Personal Computer Memory Card Interface Association) and the JEIDA (Japan Electronic Industry Development Association).

[0127] An example of the PC card is a memory card consisting of nonvolatile ~~and memory chips~~ as well as erasable/rewritable memory chips, such as an EEPROM (Electrically Erasable and Programmable ROM). When the receiving system 10-A is ~~constructed in a of~~ relatively small size and ~~at a~~ low price, it is sometimes difficult ~~from the design viewpoint~~ to integrate a large capacity and large volume HDD 17. In such a case, it is ~~considered~~ preferable to use a detachable and portable memory card. ~~vis-a-vis the receiving system 10-A. Such Detachable detachable~~ memory cards 65, however, need not to be limited to ~~the form factor of a~~ PC card, but ~~they may~~ instead be so-called "memory sticks."

[0128] The display controller 57 ~~is a controller dedicated to~~ controls the display output of broadcast program information based on the data broadcast contents.

[0129] ~~In this digital broadcast data receiving system 10-A~~ Thus, the CPU 11 controls the tuning operation of the tuner 51 according to ~~the~~ user input commands received through the user interface controller 56, and controls the display of



program information. In other words, the CPU 11 processes the digital broadcast data transferred from the TS decoder 53, converts ~~them~~ the data into display data, and ~~supply~~ supplies the ~~same~~ display data to the display controller 57. The display controller 57 generates picture signals comprised of program information based on the display data and supplies ~~them~~ the picture signals to the multiplexer 55B. ~~And~~ The CPU 11 also processes voice data contained in the digital broadcast data and supplies the same to the multiplexer 55A through the bus 50. The multiplexers 55A and 55B respectively multiplex ~~each of~~ the display data and voice data supplied from the CPU 11 ~~with~~ using the picture data and voice data outputted from the AV decoder 54 as the main body of broadcast program ~~and for external output externally to each of~~ the display 61 and the speaker 62. ~~The processing of digital broadcast data will be described in detail later.~~

[0130] Fig. 7 shows the ~~schematic hardware configuration of the~~ a digital broadcast data receiving system 10-B related according to another embodiment of the invention. The receiving system 10-B ~~related to this embodiment is executed by providing~~ is controlled by a general-purpose computer 30 ~~with having~~ a digital tuner card 40 for receiving satellite digital broadcasts.

[0131] ~~A~~ The digital tuner card 40 consists of a tuner 51, a demodulator 52, a TS decoder 53, an AV decoder 54, RAMs 53A and 54A, and multiplexers 55A and 55B. ~~Its~~ The configuration and functions ~~are of these elements shown is almost substantially identical with the hardware block elements shown in Fig. 6 having the same reference numbers. as the one shown in Fig. 6.~~ The digital satellite broadcast tuner card 40 is connected ~~with~~ to a system bus (such as a PCI bus) 31 in the computer system 30 ~~through~~ via a bus interface (such as a PCI interface) 58 ~~(illustrated).~~

[0132] The broadcast wave received by an antenna (not shown) is ~~tuned in to~~ selected by the tuner 51 and demodulated by the demodulator 52. The TS decoder 53 interprets the demodulated transport streams and divides ~~them~~ the transport stream into AV data, compressed according to ~~by~~ the MPEG 2 ~~method~~format, and into data broadcast contents. The AV data ~~are~~is supplied to the AV decoder 54, processed in the ~~same way as stated~~manner described above, and outputted ~~externally~~ to the external display 61 and to the speaker 62. The data broadcast contents, on the other hand, ~~are~~is transferred to the computer system 30 through a ~~the~~ PCI (~~Peripheral Component Interconnect~~) interface 58 to be processed by the CPU 11 ~~in of~~ the system(~~described later~~).

[0133] The general-purpose computer system 30, ~~on the other hand,~~ includes a printed circuit board (not shown) ~~loaded with~~having a CPU 11 and other main circuit components. ~~The and board is also called a~~ "mother-board." The ~~aforementioned~~ tuner card 40 is provided, for example, in the form of an "adaptor card" and ~~is inserted into~~ a bus slot (not shown) ~~installed~~located on the mother-board.

[0134] ~~The~~ Alternatively, the tuner card 40, ~~however,~~ is supplied ~~not in the form of an adaptor card but~~ in the form of a PC card in accordance with the standards established by the PCMCIA (~~Personal Computer Memory Card International Association~~)/JEIDA (~~Japan Electronic Industry Development Association~~) and is incorporated into ~~the system configuration of~~ the computer system 30 by ~~being inserted~~being inserted into a PC card slot 19.

[0135] The CPU 11 ~~is~~ serves as a main controller ~~that generally~~and controls the operation of the ~~whole~~ computer system 30. The CPU 11 ~~related to this embodiment~~ can execute various software programs (~~described later~~) for processing XML contents, such as XML parsing or XSL processing, ~~for XML~~

engines) on a ~~platform provided by~~ an operating system (OS) platform.

[0136] The processor bus is directly connected with the external pins of the CPU 11 and is interconnected with the system bus 31 through a bus bridge 20.

[0137] The bus bridge 20 ~~of the present embodiment~~ includes a data buffer for absorbing the differences in data speeds between the processor bus and the system bus 31 and includes a memory controller for controlling ~~the memory~~ access to the RAM 12.

[0138] The RAM (Random Access Memory) 12 is a writable volatile memory ~~used to~~ for loading the executable program code ~~for of~~ the CPU 11 and ~~to write~~ for writing work data for the ~~execution~~ programs. ~~It is~~ The RAM is normally constituted ~~by of~~ a plurality of DRAM (Dynamic RAM) chips.

[0139] The system bus 31 is a common signal transmission line ~~including that includes~~ an address bus, a data bus, a control bus, etc., and which, for example, may be a PCI (Peripheral Component Interconnect) bus. ~~corresponds to this.~~ ~~On the system bus 31, v~~ Various peripheral devices meeting the PCI interface standard are interconnected. An example of such a peripheral devices is the digital satellite broadcast tuner card 40. These peripheral devices on the bus 31 are ~~respectively allocated their~~ particular I/O addresses (or memory addresses), and the CPU 11 ~~(more precisely)~~ a program executed by the CPU 11 ~~can realize~~ controls the transfer of data and commands to the peripheral devices ~~desired by designating~~ using the I/O addresses (or memory addresses) of the peripheral devices.

[0140] The ROM (Read Only Memory) 13 ~~is a read-only memory~~ permanently storing a self-diagnostic program, such as a ~~(POST: Power On Self Test)~~, that is executed upon switching on the power for the computer system 30 and stores the basic input/output system (BIOS: ~~Basic Input/Output System~~) for

operating hardware. The ROM 13 may ~~constituted by~~ include, for example, an electrically erasable and rewritable programmable ROM (EEPROM) ~~(Electrically Erasable and Programmable ROM)~~.

[0141] The Serial I/O (SIO) controller 14 is a peripheral controller for exchanging serially data with external apparatuses of the computer system 30. A serial port provided on the SIO controller 14 ~~accepts~~ receives an external connection with a high-speed modem 63 ~~(with a~~ a transfer rate of, for example, 56 Kbps) ~~for~~ modulating/demodulating transfer data ~~on the over an~~ an analogue telephone line. A PPP (Point-to-Point Protocol) connection to ~~with a~~ specified access point (not shown) ~~by means of using~~ a high-speed modem 63 ~~results in~~ connects the computer system 30 ~~(or the receiving system 10-B)~~ ~~being connected with~~ to the Internet 7.

[0142] ~~The~~ An IEEE 1394 interface 15 ~~is~~ provides a high-speed serial interface ~~capable of~~ for transmitting and receiving data at a speed of several hundred Mbps. The IEEE 1394 port can accept daisy chain connections or tree connections with external devices ~~adapted that conform~~ to the IEEE 1394 standard. ~~Such Examples of apparatuses according to the IEEE 1394 standard are,~~ include, for example, a video camera 64 or a scanner (not illustrated).

[0143] The hard disc drive (HDD) 17 ~~is an~~ provides external storage ~~apparatus for storing~~ programs or data written in a specified file format, and has normally a ~~large~~ capacity of about several GB. The HDD 17 is connected with the system bus 33 through the hard disc interface 16. The interface standards ~~used according to~~ whiche connect the hard disc drive is connected with the computer system 30 are, for example, an IDE (Integrated Drive Electronics) ~~or~~ standard, a SCSI (Small Computer System Interface) standard, etc.

[0144] The keyboard/mouse controller (KMC) 21 ~~is a~~ dedicated controller for processes user inputs received from

the keyboard 22 or from the mouse 23. ~~In response to the~~ The KMC 21 ~~detectsion of a scan codes~~ inputted from the keyboard 22 or a coordinate designation inputted from the mouse 23, ~~KMC21 and~~ issues an interrupt request to the CPU 11. ~~In the present embodiment,~~ Ordinary command inputs to the computer system 30 and other input operations to the receiving system 10-B, including channel selection, can be performed through the keyboard 22 and the mouse 23.

[0145] One of the function keys of the keyboard 22, or one of the menu buttons disposed on the display 61 is allocated to ~~a button for operating~~ the validation or invalidation of display outputs received from the video controller 24 ~~(or from the display outputs of program information based on the digital transfer data).~~

[0146] The card interface 18 ~~is a device for executing~~ the bus protocol between the bus 50 and a card-type device 65 inserted into the card slot 19, ~~. An example of card-type device 65 is such as a PC card having of a credit card size and constituted as a cartridge shape.~~ The operation of the PC card is governed by the "PC Card Standard" jointly formulated by the PCMCIA (Personal Computer Memory Card Interface Association) and the JEIDA (Japan Electronic Industry Development Association).

[0147] ~~An example of t~~ The PC card is ~~may be a memory card consisting comprised of nonvolatile and erasable/rewritable memory chips, such as an EEPROM. (Electrically Erasable and Programmable ROM)~~ When the digital broadcast receiving system 10-B is ~~constructed in a~~ designed to be of relatively small size and at a low price, ~~it is sometimes difficult from the design viewpoint to integrate~~ integration of a large capacity and a large volume HDD 17 is difficult. In such a case, ~~it is considered preferable to use a detachable and portable memory card is are preferred.~~ vis-a-vis the receiving system 10-B. The ~~Detachable~~ memory cards 65, however, need not to be

limited to ~~the form factor of a~~ PC card, but they may be ~~so-called~~ "memory sticks."

[0148] The video controller 24 ~~is a controller dedicated to~~ controls the screen display based on a plotting instructions given by the CPU 11, and is provided with a frame memory (VRAM) 25 for temporarily storing the plotting information. ~~Preferably, Incidentally, in order to carry out well the present invention, it is preferable that the~~ video controller 24 ~~would have~~ has a plotting capacity ~~of~~ for at least VGA (Video Graphics Array) or, more preferably, ~~(for example,~~ SVGA (Super Video Graphics Array) or XGA (eXtended Graphics Array).

[0149] ~~In this digital satellite broadcast receiving system 10-B, t~~The CPU 11 controls the tuning operation of the tuner 51 and controls the display of program information in response to commands inputted by the user through the keyboard 22 or the mouse 23. In other words, the CPU 11 processes the digital broadcast data supplied from the TS decoder 53, converts the ~~same~~ processed data into display data and supplies the ~~same~~ displayed data to the video controller 24. The video controller 24 generates image signals for program information based on the display data, and supplies the ~~same~~ image signals to the multiplexer 55B. ~~And the~~The CPU 11 also processes the voice data contained in the digital broadcast data and supplies the ~~same~~ voice data to the multiplexer 55A through the bus 50. The multiplexers 55A and 55B each multiplex ~~each of the~~ display data and voice data supplied from the CPU 11 with the image data and voice data outputted from the AV decoder 54 ~~as the main body of broadcast programs, and then output them respectively result~~ to the display 61 and the speaker 62, respectively. ~~In the meanwhile, the processing of the digital broadcast data will be described in details later.~~

[0150] ~~Incidentally, the constitution of t~~The satellite digital data receiving system 10 requires many of the

~~same electric circuits in addition to those~~ shown in Figs. 6 and Fig. 7. These circuits are, however, known to those skilled in the art, ~~and they do not constitute the purpose of the present invention.~~ are ~~Ttherefore, they are omitted in the present specification. And in order t~~To avoid needless complications of the drawings, the connections among various hardware blocks are illustrated only partially. ~~This is a point to which attention must be paid.~~

[0151] For example, ~~although not illustrated in Figs. 6 and Fig. 7,~~ the receiving system 10 may be provided with a FDD (Floppy Disc Drive), a CD-ROM drive, a MO (Magneto-Optical) disc drive and/or other external storage devices into which apparatuses wherein a FD (Floppy Disc), a CD-ROM, an MO and/or other portable recording media which may be loaded and then accessed for writing data and retrieving data.

[0152] Fig. 8 shows ~~schematically~~ the hierarchical structure of various software programs executed by the digital broadcast data receiving system 10. ~~The following are explanations on the functions of each layer of software~~ are as follows:-

[0153] The hardware control layer, shown as ~~at~~ the bottom layer, ~~is intended to absorb~~ differences between the ~~in~~ hardware vis-à-vis the top software, such as the operating system (OS), and executes processing in response to direct input/output operations that are generated by the ~~on each~~ hardware ~~and in the form of~~ hardware interrupts.

[0154] The hardware control layer is provided to the receiving system 10 in the form of a BIOS (Basic Input/Output System) stored permanently, for example, in the ROM 13, or in the form of "device drivers" installed in the HDD 17.

[0155] The operating system (OS) is the basic software for ~~generally~~ managing the hardware and software in the receiving system 10. The OS includes various subsystems such as "the file manager" for managing the file records on the HDD 17,

"the memory manager" for managing memory spaces, "the resource manager" for managing the allocation of system resources, "the scheduler" for managing the execution of tasks, "the window system" for controlling the window displays on the display, etc.

[0156] The system service is ~~an assembly~~ a collection of functions ~~to which that~~ applications and other higher layer programs may use ~~have recourse~~ to call various functions of the OS, and includes an API (Application Programming Interface) and a run-time library ~~correspond to this~~. The ~~presence of~~ the system service eliminates the needs for applications to directly operate ~~directly~~ various hardware, devices and ensures the consistency of the hardware operation.

[0157] The XML applications are ~~programs for controlling~~ the way broadcast data ~~broadcast~~ is displayed and outputted, and are comprised of XML instances ~~described that~~ are written in a XML using language ~~provided with~~ arbitrarily definable tags. ~~called XML~~. Each XML instance may be accompanied by a DTD document for defining the document format, a XSL document serving as a style sheet for prescribing the display format, ~~for a CSS, or XSLT, a standard derived from XSL~~ or other style sheets.

[0158] The XML parser is a ~~software program~~ for parsing DTD documents and XML documents, and for delivering document objects or other results of the parsing operation to the XSL processor. ~~This~~ The document object is a structured document ~~for which having~~ a tree structure ~~is formed~~ in accordance with the tags ~~in of~~ the original XML document.

[0159] The XSL processor ~~is a software program for~~ converting document objects into an expression that is formatted according to the description of the XSL document. More specifically, document objects are retrieved from a tree data source, and various elements of the tree are converted into execution objects. ~~For example, they~~ objects are



converted into API (Application Programming Interface) against the XML browser. ~~Or Alternatively, if such an~~ the element is written in a JAVA script, objects that can be ~~thrown~~ delivered into a Java VM engine are generated-~~).~~.

[0160] ~~And now, t~~The method of receiving XML instances and other data broadcast contents in the digital satellite data broadcast receiving system 10 is now~~will be~~ explained.

[0161] In the digital satellite broadcast system, as shown in Fig. 9, ~~to begin with~~ broadcast waves are first uploaded from the broadcast server 1 to the broadcast satellite 5 and then ~~they are~~ downloaded from the satellite 5 to the receiver/decoder 10.

[0162] As explained ~~already above~~ with reference to Fig. 3, broadcast contents ~~are~~ is constituted as "a transport stream" ~~made-formed~~ by multiplexing AV data, which is first compressed by ~~the~~ according to prescribed compression standard, ~~method~~ such as MPEG (Motion Picture Experts Group) 2, and data broadcast contents. ~~{A~~The transport stream is also broken down into transport layers ~~of~~ in accordance with the OSI (Open Systems Interconnection) reference model-~~).~~.

[0163] ~~And as~~As explained above with reference to Figs. 6 and ~~Fig. 7,~~ the TS decoder 53 interprets ~~this~~ the transport stream and divides it into ~~the~~ an AV data portion and ~~the data~~ a broadcast contents portion. The AV data portion is processed by the AV decoder 54, and the data broadcast contents portion is processed by the CPU 11.

[0164] The data broadcast portion is ~~constituted~~ by comprised of a plurality of modules. Each module contains an EPG, advertisement information and other ~~various~~ information ~~accessory~~ supplementary to the main body of broadcast programs. ~~And the~~The data broadcast contents portion is transformed into a data carousel, format wherein ~~and~~ each data module appears repeatedly during the broadcast of the broadcast body. ~~{As a result, the receiving system 10 may as a~~

~~viewer can obtain any desired data modules at an optional~~  
~~optimal timing during the broadcast period of the program and~~  
~~can omit providing cache memories for cache.~~

[0165] On the receiving system ~~10~~ side 10, the necessary ones ~~among of these received data broadcast contents received~~ are stored temporarily ~~at in~~ a local storage device of the receiving system 10, such as an HDD 17 ~~(or a memory card 65)~~.

[0166] In a one-way transmission environment, such as a satellite broadcast, contents written in the standard XML language are transmitted in a format in which XML instances and style sheets are packed together ~~except where~~unless the style sheets used ~~are~~is limited.

[0167] In the present embodiment, the data broadcast contents portion ~~among of the broadcast signals~~ contents ~~assumes that the transmission of only XML instances and that of only style sheets are transmitted~~ in addition to the joint packing of a multimedia coding application ~~consisting formed of XML instances and a style sheets~~ prescribing the expression format of the XML or (XSL document, etc.). ~~And the~~ The style sheet may be downloaded ~~in the form of~~ as a file supplied through the Internet, ~~or via other networks,~~ or may be supplied ~~in the form of~~ by a portable recording medium such as an FD, a CD-ROM or an MO.

[0168] The receiving system 10 ~~related to the present embodiment~~ is stored separately from the XML instances and style sheets supplied. In other words, an external storage apparatus 17/65 for storing these document files ~~provided~~ consists of a document body storage section 81 for storing and managing XML instances (which may include a DTD document, however), and a style sheet storage section 82 for storing and managing only XSL documents as style sheets. As ~~S~~ style sheets ~~have become~~are getting more sophisticated in their functions and added values, ~~and the~~ style sheets or XSL documents ~~themselves have become~~acquired a character of valuable written

works in the same way as documents proper. Therefore, ~~in order~~ to eliminate the unauthorized use or illicit use of style sheets, it is preferable that the style sheets storage section 82 be a secure storage area managed for security.

[0169] ~~And in the present embodiment,~~ The receiving system 10 is designed in such a way that style sheets supplied from outside are at first selected in the style sheets selecting section 83, and then the selected style sheets are stored in the style sheets storage section 82. The style sheets selection section 83 selects style sheets based on mainly on the output attributes of the display apparatus 18/68, ~~and as well as based on~~ the contents attributes of the data broadcast contents received ~~as~~ XML instances. ~~This point will be explained in more details below.~~

[0170] ~~A~~The following is a description of the method of selectively storing style sheets supplied in the receiving system 10 is now provided by referring to Fig. 10.

[0171] As shown in Fig. 10, a number of distribution routes ~~can be mentioned~~ is available for supplying style sheets to the receiving system 10. For example, ~~a part of the data broadcast waves is used~~ signal in the form of data carousel, ~~(see shown in Fig. 3),~~ is used to transmit style sheets from the broadcast server 1 to that supplies an antenna and the tuner 51.

[0172] ~~And~~ The style sheets are may also be supplied as by one of the information distribution services operated on the Internet. In other words, ~~there is~~ "a style sheets server", ~~(see Fig. 2), that supplies style sheets on via~~ the Internet 7, and the receiving system 10 ~~can obtains~~ them style sheets by ~~means of~~ a file transfer, such as using ~~(FTP+)~~ (File Transfer Protocol). The style sheet server ~~in this case may~~ be operated by the same broadcast server 1 that transmits the main body of the data broadcast contents or by a "style sheet dealer" distributor (provisional name) that specializes in

the manufacture and distribution of style sheets. ~~And The~~ style sheets may be distributed by style sheet servers for a consideration or free of charge.

[0173] ~~And Also,~~ style sheets may be stored in portable recording media, such as a CD-ROM, an MO, a DVD, memory sticks, etc., and may be carried or transported ~~among-between~~ computer systems. For example, CD-ROMs containing style sheets may be marketed, rented or distributed ~~among-to~~ general users as a supplement to a magazines.

[0174] The style sheets selection section 83 selects only the ~~necessary~~ style sheets necessary infor the current application from the receiving system 10 from among one or more style sheets that are supplied as mentioned in the manner described above. The selection section then ~~and stores them~~ the selected style sheets in a local external storage device, such as an HDD 17 ~~for a memory card 65~~. ~~More-s~~Specifically, output attributes that are stored in the output attribute storage section 85 or contents attributes that are stored in the contents attributes storage section 86 are inputted into the determination logic 84, ~~and-so~~ that only the style sheets meeting-that meet the requirements set by the determination logic are extracted and stored.

[0175] The "output attributes" ~~referred to hererefer~~ to the resolution attributes and other display ~~capacities~~ characteristics of the display 18/, 68 ~~and-or~~ other display apparatuses ~~outputting-that~~ output data broadcast contents consisting-formed of the XML instances, ~~as well as refer to~~ the name of manufacturer and model name of the display apparatuses. The ~~means-of-obtaining~~ manner in which the output attributes are obtained by the output attributes storage section 85 ~~itself-is not questioned-in~~ particularly pertinent. For example, they output attributes may be obtained automatically from the display 18/68 that is connected by cable to the receiving system 10 in accordance with ~~the-a~~

prescribed communication procedure at the time of ~~boot~~system start up. ~~Or~~Alternatively, users may manually input ~~them~~ through the attributes using the user interface of the receiving system 10.

[0176] The selection of the style sheets ~~by taking into~~as a function of the account output attributes ~~results from~~depends on the differences ~~between in~~ the optimum format of a display ~~depending on~~and the capacity of the display ~~apparatuses~~. (For example, the optimum display format for a high-resolution, ~~and~~high-definition HDTV is not always adequate for a small-screen, ~~and~~low-resolution PDA.)

[0177] ~~And~~The term "contents attribute" refers to the contents and characteristics of the XML instances. ~~Contents~~ The content attributes can be identified, for example, by parsing tags in the XML instances, ~~(see as~~ Table 1 ~~below~~shows). Instead of parsing the contents attributes on the receiving system 10 side, however, the data broadcast contents may be distributed by including contents identifiers corresponding to the ~~predetermined~~ parsing results ~~in the~~ contents in advance.

Table 1.

<POSITION>	<NUMBER>	<MPEG4>
<COLOR>	<PATTERN>	<VIDEO>
<SIZE>	<BOX>	<AUDIO>
<FONT>	<POINT>	<AVI>
<TEXT>	<CIRCLE>	<CGI>
<GRAPH>	<TRIANGLE>	<MOVIE>

<PICTURE>	<ARC>	<VECTOR>
<PALLET>	<DOT>	<HEADER>
<MENU>	<DIGIT>	<CHARACTER>
<FIGURE>	<CODE>	<WORD>
<WINDOW>	<FILE>	<STRUCT>
<HELP>	<BITMAP>	<MEMO>
<CLIP ART>	<MPEG>	<EVENT>
<SLIDE>	<MPEG1>	<LOGO>
<MODE>	<MPEG2>	<TASK>
<COPY>	<WIPE>	<FAST>
<CONTROL>	<EXPAND>	<SLOW>
<STATUS>	<TASK>	<CAPTURE>
<COMMAND>	<JOB>	<PLAY>
<FUNCTION>	<SPIN>	<REC>
<DATA>	<ELEVATE>	<VIEW>

<TIME>	<COLLECT>	<LINK>
<DATE>	<EXECUTE>	<JUMP>
<OBJECT>	<HOLD>	<MARK>
<GUIDE>	<AUTO>	<ID>
<SPELL>	<SYNC>	<EJECT>
<LANGUAGE>	<ASYN<	<STOP>
<CAPTION>	<START>	<SLEEP>
<FOCUS>	<FORWARD>	<CONTINUE>
<ZOOM>	<REVERSE>	<GO>

[0178] Style sheets are selected ~~by taking into account as~~ a function of the contents attributes because the optimum format of a display often differs depending on the elements included in the contents and the type of ~~monomedium~~ medium. (For example, the optimum format of a display ~~differs~~ may differ depending on whether the type and size of fonts specified in the display text, and whether the bitmaps or the drawings are included ~~or not.~~)

[0179] The determination logic 84 provides indices for selecting style sheets depending on the output attributes and/or contents attributes ~~as mentioned~~ described above. The determination logic 84 may be, for example, in the form of a lookup table, or in the form of rules ~~composed by~~ formed of if logic statements ~~sentences~~.

[0180] Table 2 below shows examples of termination logics 84 related to the output attributes ~~constituted and is~~ arranged in the a lookup table form. In this case, The resolution can be indicated from the display type obtained from the output apparatus 18/68 or from the output attributes, and the optimum choice of style sheets can be selected on that basis.

Table 2

<DISPLAY TYPE>	<X size>	<Y size>
<HDTV>	1920	1080
<SDTV>	704	480
<VIDEO-CD>	352	240
<SXGA>	1280	1024
<XGA>	1024	768
<SGA>	800	600
<VGA>	640	480
<CGA>	160	120
<JPEG>	704	480

[0181] ~~And~~ Table 3 below shows examples of determination logic 84 related to the content attributes ~~constituted and is~~ arranged in the a lookup table format. In this case, the optimum style sheet or the XSL documents file name can be retrieved according to the content identifiers described in the data broadcast contents.

Table 3.

Content-ID	XSL FILE



0		BS-type 1
1		BS-type 1
2		BS-type 1
3		BS-type 2
4		BS-type 2
5		BS-type 3
6		BS-type 4
7		BS-type 5

[0182] And—Fig. 11 shows examples of the determination logic 84 ~~related to for the contents attributes described as set out in the rulea~~ formats consisting of "if" logic sentences. The optimum style sheet is determined by throwing applying the contents identifiers provisionally stored in the contents attribute storage section 86 into the determination logic 84. Accordingly, the XSL file to the figure, "BS-type 1.xsl" is ~~automatically~~ selected for a data broadcast contents havingwith less than three contents identifiers ("contents\_id"), "BS-type 2.xsl" is ~~automatically~~ selected for data broadcast contents with—having from three to less than five identifiers, "BS-type 3.xsl" is ~~automatically~~ selected for data broadcast contents having from—with five to less than six identifiers, "BS-type 4.xsl" is ~~automatically~~ selected for

data broadcast ~~contents with~~ content that have from six to less than seven identifiers, and "BS-type 5.xsl" is ~~automatically~~ selected for data broadcast ~~contents with~~ having seven or more identifiers.

[0183] ~~In the meanwhile, w~~When the style sheets, which are ordinarily selected based on the basis of the output attributes and/or the contents\_ attributes, are not found in the local ~~of~~ the ~~receiving~~ system 10, ~~(i.e., when they have not been received as~~ stored in a data carousel or have not been ~~supplied~~ stored in the ~~form of a~~ portable recording medium), the receiving system 10 may ~~be constituted in such a way that applications for retrieving~~ retrieve the information ~~spaces~~ envia the Internet 7, such as using a ~~WWW~~Web Browser, are ~~started~~ so that files may be ~~automatically~~ downloaded from the style sheet server.

[0184] ~~In carrying out the present invention, t~~The waymanner in which the style sheet server supplies style sheets to the receiving systems 10 is not ~~specially limited to~~ a particular method. For example, the receiving systems 10 may specify the file name of style sheets and download files from the style sheet server using ~~ordinary~~ the known FTP (File Transfer Protocol).

[0185] ~~Or~~Alternatively, the receiving systems 10 may send a request to the style sheet server ~~requests for the~~ to supply ~~of~~ style sheets ~~accompanied together~~ with output attributes and/or contents attributes. ~~In this case, the~~The style sheet server then processes the request, retrieves style sheets from its own local disc ~~(or from a remote disc on the Internet 7),~~ finds ~~out the~~ style sheets matching ~~with the~~ request, and returns the ~~same matching~~ style sheets to the receiving system 10 ~~having that~~ made the request. Ordinary Web servers, ~~that which~~ do not contain the function of retrieving retrieve from databases, may ~~constitute~~ serve as a style sheet servers by ~~the Web server starting by~~ initiating an external program ~~(CGI~~

application) using a CGI (Common Gateway Interface) application.

[0186] The following is a description of the method of processing the data broadcast contents received in the receiving system 10 is now described with reference to Fig. 12. ~~As mentioned below, the~~ application matching of a style sheet ~~matching~~ with the output attributes of the output apparatus 18/68 and/or with the contents attributes of the data broadcast contents converts the XML documents ~~as the broadcast content body~~ into a desired executable format to obtain and leads to the realization of the optimum display format of display.

[0187] The receiving system 10 ~~obtains~~ receives one or more style sheets as a part of the data broadcast contents or ~~through via~~ other distribution channels. The main body of data broadcast contents is not necessarily limited to documents written in the XML language format, or to the XML instances. ~~They and may be, for example, written in a language format other than XML, for example SGML (Standard Generalized Markup Language), HTML (Hyper Text Markup Language), etc. And the~~ The main body of data broadcast contents may include XML instances and other DTD documents. ~~And a~~ A style sheet is a document file prescribing the expression format of the main body of an XML instance may be written, for example, in the XSL format.

[0188] Fig. 13 illustrates ~~schematically~~ the document construction of a XML instance. ~~handled in the present embodiment. As shown in the figure, a~~ a single XML instance is formed of a series constituted by a serial linkage of linked instances of identical service contents that are each to be offered but with different display types or with different output attributes. In the case of When the content is written in the XML language, the ~~option~~ definition of the tags enables the to connection of serially connected, but different, broadcast contents by dividing them content by its tags. As a

result, it is possible to distribute information ~~supply~~  
~~service~~ for all the possible output attributes ~~by using~~ a  
single SML instance, or a single data module, and therefore ~~to~~  
~~use effectively~~ efficiently use the transmission line band  
width.

[0189] ~~As shown in Fig. 13, w~~When a single data broadcast  
content includes a plurality of XML instances, an appropriate  
XML instance is ~~taken out~~selected based on the output  
attributes held in the output attribute holding section 85.  
The XML instance ~~taken out~~then is then inputted into a parsing  
program, ~~called known as a~~ "XML parser", ~~to be~~which then  
outputs the processing result as a document object, and  
delivers the ~~same object~~ to the ~~subsequent~~ XSL processor  
module. Incidentally, ~~t~~The document object ~~is typically~~  
~~referred here should be understood as a structurized document~~  
~~having~~ for which a tree data structure ~~was formed~~that is  
defined according to the XML tags ~~in the former XML instance~~.

[0190] An XSL document is a style sheet, ~~as~~ ~~(mentioned~~  
~~earlier,~~ for prescribing the expression format of XML  
instances, ~~(for examples~~ such as the, display format that is  
sent to the output apparatus 18/68, and for prescribing the  
print ~~format~~ sent to the printer (not shown). ~~In the~~  
~~present embodiment,~~ ~~a~~An external storage apparatus 17/65  
~~installed in the receiving system 10~~ accumulates in advance  
one or more XSL document file or files. ~~Various~~ The  
accumulated style sheets are ~~thus accumulated,~~ however, ~~had~~  
~~been selected at the style sheet selection section 83 (as~~  
~~mentioned earlier).~~ described above.

[0191] The XSL processor ~~takes out~~copies XSL documents from  
the external storage apparatus 17/65, and converts the  
document objects ~~in accordance with the description of the XSL~~  
~~documents~~ into executable objects corresponding to ~~the~~ a  
prescribed style in accordance with the description of the XSL  
documents. An executable object is, for example, an API

(Application Programming Interface), ~~a~~ LIB or other command~~s~~ sent to the browser to make the main body of data broadcast contents available for inspection.

[0192] ~~Or, if~~ If the original code is a Java script, it is ~~thrown~~ delivered into the Java compiler (not shown) to be converted into an intermediate code called a "byte code."

[0193] ~~And the~~ executable document thus created is ~~thrown~~ delivered into an execution engine~~s~~, such as a ~~An example of execution engine is~~ browser used for plotting on the display 18 (or 68). The browser may be an XML browser ~~enabling to browse that processes only XML documents or may be a HTML browser for that processes the HTML documents.~~ The ~~B~~browser and other execution engines generally operate on a platform provided by the operating system~~s~~, ~~In other words~~ such as, by calling an API (Application Programming Interface) provided by the operating system. ~~enables to process efficiently.~~

[0194] ~~And an~~ An execution object, called a "byte code", that is created by the Java compiler is then delivered on ~~thrown into a~~ Java VM (Virtual Machine) engine. The VM engine ~~enables to perform automatically on~~ carries out, using an application or ~~on~~ using an OS, a series of processing steps that combines operating procedures, ~~(for examples~~ such as specific keys and buttons~~)~~, that end users can control.

[0195] As a variation ~~to~~ of the present invention, ~~a method of using only a single style sheet is issued to address to a plurality of contents attributes and output attributes instead of preparing a style sheet for each contents attribute or output attribute. may be considered.~~ Such a system can be achieved by using, for example, Java script.

[0196] ~~For example, while~~ Though the style sheets stored in the receiving system 10 are designed for specific contents attributes and/or specific output attributes, the processing required for applying the data broadcast contents or the

output apparatuses ~~with~~to other attributes may be described in Java script.

[0197] Fig. 14 shows ~~schematically~~ examples of a processing of matching an output apparatus with output attributes and/or contents attributes and which is described in Java script. As ~~shown in the figure, a single~~ A XSL document file includes a portion of Java script portion written in Java language as well as in addition to the code portion written in the XSL format.

[0198] The body of a style sheet, which is written in the XSL format, prescribes a display format for HDTV (High Definition TeleVision) as the display type. The Java script portion, on the other hand, describes processing for other display types, such as other than HDTV, for example SDTV, SVGA, XGA, VGA, etc... by the according to the if-rule sentence format. Therefore, ~~bBy processing adequately using the if-if-rule sentences that are based on the output attributes stored in the output attributes storage section 85, it is possible to perform an operation for the display output is matching matched with the output apparatus 18/68.~~

[0199] ~~And the following fFormula (1) shows schematically another example of the processing matching to with the output attributes, and/or contents attributes and described in Java script.~~

Formula

```
<SCRIPT LANGUAGE="JavaScrip"><xsl:comment><![CDATA[  
var font_size;  
font_size=documentElement.childNodes.item (0);  
if(font_size=1) htmlString ="<H1><FONT SIZE=8>"  
if(font_size=2) htmlString ="<H1><FONT SIZE=12>"  
if(font_size=3) htmlString ="<H1><FONT SIZE=14>"  
]]</xsl:comment></SCRIPT>
```

.....(1)

[0200] Among the scripts shown in the formula (1) above, the tag <SCRIPT LANGUAGE> shows the actual script portion. This script ~~is constituted by~~ consists of a conditional sentence ~~of the~~ in an "if" format. More specifically, the display font size of data displayed in the tag <H1> is to be ~~set actively~~ set by the receiving system 10, ~~and not by~~ rather than the contents distributing side (or the broadcast server 1 side), according to the value substituted for a variable font\_size.

[0201] ~~In other words~~ Thus, if font\_size = 1, the font size of data displayed will be 8 point (see Fig. 15A), if font\_size = 2, the font size of data displayed will be 12 point (see Fig. 15B), and if font\_size = 3, the font size of data displayed will be 14 point (see Fig. 15C).

[0202] ~~Incidentally,~~ detailed information on the Java script ~~itself can be found on~~ in various manuals, such as ~~available on the market (for example,~~ "Introduction to Java Script for Decorating Homepages", revised version", by Asao Nishikawa, and Gijutsu Hyoron-sha).

[0203] ~~So far,~~ The present invention has been explained with reference to specific embodiments. It is evident, however, that those skilled in the art may modify or substitute these embodiments to the extent that they do not deviate from the purpose of the present invention. In other words, the aspects of the present invention ~~is~~ are disclosed only as ~~examples~~ and should not be interpreted so restrictively. ~~In order to judge the purpose of~~ The present invention is better defined by the column of "Claims". ~~shown later should be referred.~~

Industrial applicability

[0204] As described in details above, ~~according to the present invention,~~ it is possible to provide a ~~an outstanding~~ data distribution technology that delivers ~~capable of providing~~ documents in a language format in which arbitrarily

definable tags are used, - (for example, XML (eXtensible Markup Language)), in a format that is ~~matching~~ matched with the output attributes and/or the content attributes.

[0205] ~~And according to~~ The present invention also, it ~~is possible~~ provides an ~~outstanding~~ data distribution technology for ~~capable of~~ providing single content information in a format for that can be used to ~~matching~~ with output attributes and/or contents attributes while ~~on the occasion of~~ distributing data ~~through using a~~ broadcast or via a network.

[0206] When the present invention is applied to a satellite or ground wave broadcast business, it is possible to provide information matching with output attributes or contents attributes based on a single content.